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# A NEW START FOR AN OLD CROP

by EDWARD J. WEBER *

Quinoa, an ancient cereal crop first cultivated by the Incas, may provide an answer to the Andean region's shortage of locally produced food protein. After centuries of neglect, researchers in a number of Latin American countries, are turning their attention to this crop, known to be one of the most nutritious of grains.

Quinoa (chenopodium quinoa Willd, to give the plant its full name), is a member of the Chenopodiaceae or goose foot family, of which some 60 species are found around the world. Archeological remains in Europe show that chenopods were also used as grain there, and various forms of the species are still grown today in hilly areas of northwest India. Nowhere, however, did the species become an important crop except in the Andean region.

Unlike potatoes and maize, however, quinoa was ignored by the Spaniards, and this neglect has continued until very recently. In 1965, there were the first stirrings of a renewed interest in the crop on the part of a number of researchers in Bolivia and Peru. This has led to the development of improved varieties and a better knowledge of the major characteristics of the plant itself, its cultivation and major constraints.

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Quinoa is normally sown at altitudes of from 2,000 to 4,000 metres and most varieties are resistant to frost. It will also yield at lower levels, in poor soils with an annual rainfall as low as 300 to 400 mm. A number of diseases and pest affect the plant, notably mildew and leaf spot, but the most serious economic threat comes from birds which attack when the crop is about to ripen. Yields can vary enormously according to growing conditions--they may be as low as 450 kilograms per hectare or as high as 2,000--but the average on the antiplano is about 800 to 1,000 kg/ha.

There is no doubt about quinoa's superiority to most other cereal grains in terms of protein content. This superiority is due principally to the quality of its protein, since it has a good balance of the essential body-building animo acids, especially lysine (six percent). Protein content averages about 14 percent, although some studies have reported as high as 20 percent and others as low as 12 percent. In addition quinoa contains necessary vitamins such as vitamin C and B complex of thiamine, riboflavin and niacin.

In poultry feeding trials reported in Bolivia, chicks fed a ration containing cooked quinoa made gains equal to those receiving corn and skim milk. Rations containing uncooked quinoa, however, depressed the growth rate of both chicks and swine.

The reason for this drastic change in growth patterns is the presence of bitter-tasting saponins, glucosides which are found in the seedcoat of quinoa and which have a toxic and/or growth depressing effect on animals.

Saponins can be removed from the grain by repeated thorough washing, a process that is shortened if lime is added to the water. Cooking also helps to remove both the bitter taste and the toxic effects. In Peru, machines have been developed for large-scale processing of quinoa in industrial use, such as the preparation of wheat-quinoa flour mixes.

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The other alternative is the development of saponin-free varieties such as the Bolivian variety Sajama, which is practically free of saponins although it still has a slightly bitter taste. Unfortunately it appears that most of the large-grained varieties now in use have a relatively high saponin content.

The utilization and preparation of quinoa as a food is quite varied. The main uses are in soups and sweets and a coarse bread called kispiña. Various drinks are also prepared, hot or fermented. High protein cookies and biscuits can be produced by mixing up to 60 percent quinoa flour with wheat flour. The nutritive value of noodles can also be considerably increased by using up to 40 percent quinoa flour without affecting appearance or other characteristics of the end product.

The leaves of the plant can also be eaten in salads or cooked and in certain regions where vegetables are scarce this is a product of local importance. The leaves and stalks are also fed to ruminants, and the chaff and gleanings from threshing are generally fed to pigs.

Serious research into the improvement of quinoa began in 1965 at the Patacamaya Research Station in Bolivia, with the support of Oxfam and the UN Food and Agricultural Organization. The station now has a collection of some 700 different ecotypes taken mainly from farmers' fields, and a further collection in Puno, Peru, houses some 600 entries.

Quinoa research still has a long way to go, however, and a new impetus was given to the work in 1977 when the Canadian-based International Development Research Centre agreed to support a new program at the Bolivian Institute of Agricultural Technology. Further research has been underway in Peru since 1976, supported by the Simon Bolivar Fund, and administered by the Inter-American Institute for the Agricultural Sciences (IICA).

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In Peru, strong efforts are being made to increase quinoa production as a means of reducing costly wheat imports. The Bolivian government has gone so far as to pass a law requiring the use of at least five percent of quinoa flour in commercially produced breads, pastas and the like. In Chile, quinoa is being used in feeding programs to improve the nutrition of poor children.

This is just a start, however. Much of the current research is still isolated and sporadic and could benefit from better integration and an interdisciplinary approach. In an effort to promote better exchange of information, a group of researchers is preparing a book on quinoa, to be published by IICA, to pull together in one document as much of the relevant current knowledge as possible.

Pricing policies that ensure a reasonable return to the farmer, and the development of a broader market for quinoa grains are also necessary to encourage the growth of production.

A great deal remains to be done but it now seems certain that the persistance of those early researchers has finally paid off. In the near future, the grain that was once the major foodstuff for a mighty empire may once again become an important economic and nutritional mainstay in the food economy of the Andean region.

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